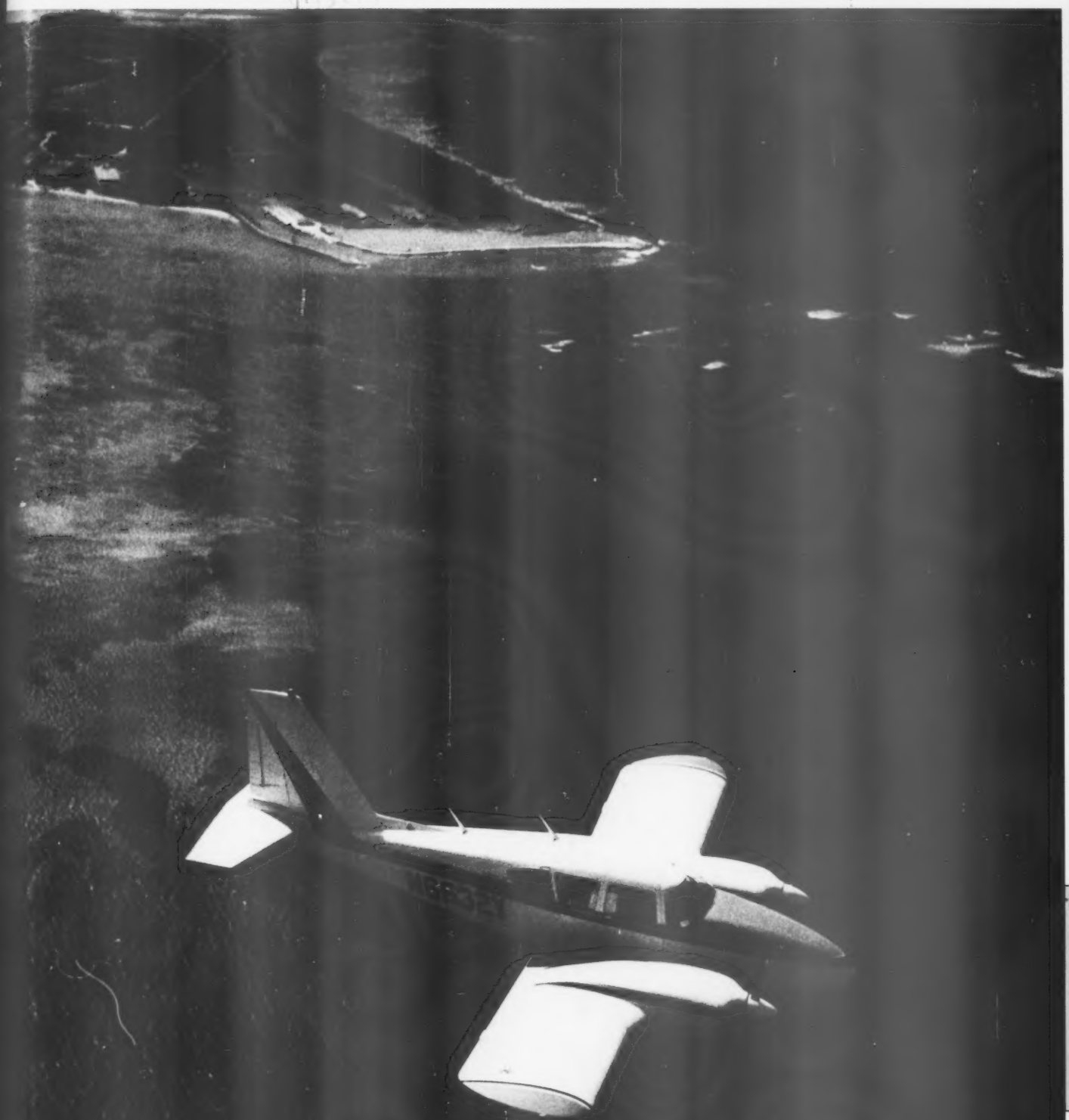
FAA AVIATION NEWS

MARCH 1972



COVER:
Omega navigation signals will travel farther than your fuel. See page 6.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION/FEDERAL AVIATION ADMINISTRATION VOL. 10, NO. 10

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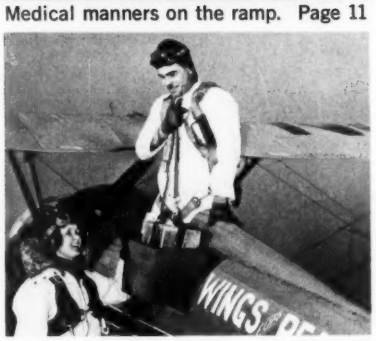

Make way for Ruthie. Page 12

John A. Volpe, *Secretary of Transportation*
John H. Shaffer, *Administrator, FAA*
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Cross Winds and Gentle Pilots

A good many of us assume that the safety rule about carrying an adequate fuel reserve on crosscountry flights, for diverting to an alternate airport when necessary, is related simply to possible weather problems. But if you have ever found yourself committed to landing in shining CAVU conditions at a small airport with a single strip temporarily favored with a roaring crosswind, you know better. Who can see the wind?

When it comes to unpredictable wind behavior, March is the season to be wary. This is the month to expect higher than average wind velocities, sudden shifts in speed and direction, as well as wide divergences from the runway. It is important to know how to land your airplane under varying wind conditions—and when not to attempt a landing. A crosswind brush-up session with an instructor is time well spent if you plan to fly to a strange airport during the windy season.

There are essentially two kinds of contrary wind conditions that affect light planes on landing: the fairly steady wind at a pronounced angle to the runway which can be determined; and the gusty, changeable wind that may be hiding behind a line of buildings or playing hide-and-go-seek amongst a clump of trees along the airfield. The latter condition, in particular, calls for instant, correct responses from the pilot, who must remember to use **aileron** for keeping his airplane *over* the runway, and **rudder** to *line it up* with the runway.

Crosswinds frequently call for cross controls—upwind aileron and opposite rudder. Airplane landing gear does not take kindly to touching down at an angle to the runway.

When the wind is gusting, you can expect a shift in almost any direction, including 180°, as you near the ground. Observe the behavior of trees, bushes, dust—anything that moves—not just the wind sock or tee. A line of trees or buildings along the upwind side of the runway may deflect the wind enough to draw a movement of air from the opposite direction over a portion of the runway, requiring a quick reversal of both aileron and rudder controls. In this situation it is hard to anticipate the gust problems, but the pilot who remembers to use aileron for lateral movement and rudder for runway alignment need not be overly concerned with the why and wherefore of wind tricks.

Some pilots attempt to minimize the angle of the crosswind by touching down at the downwind edge of the runway. This maneuver is fine when it works, but if a last minute gust of Herculean proportions blows you over the edge you are in trouble. However, if you land on the upwind edge the wind may blow the tail around in a weathervane effect with equally unhappy results. Given the soggy nature of terrain in early spring, you are probably much better off aiming for the centerline, realizing that you may be hit at any moment by a sharp blast.

How do you know how much contrary wind your airplane can handle? It may be given in your owner's manual, or it may be placarded on the panel, or it may be elsewhere. This information exists, although unless you are the original owner there is a good chance you have never seen it. It may be sketchy, simply giving you a maximum crosswind angle and a maximum wind velocity, or it may be complete, giving you windspeed maximums for every conceivable angle of wind.

The two basic pieces of information you need to know about the airplane are the maximum *headwind component* and the maximum *crosswind component*. Given this data, plus the local wind speed and direction, a pilot may make a safe "go" or "no go" decision with the aid of a simple chart or the wind side of a standard flight computer. If you place a dot on the intersection of the wind angle radial and the windspeed arc (see illustration), a horizontal line to the left will indicate the headwind component and a vertical line down will give the crosswind component.

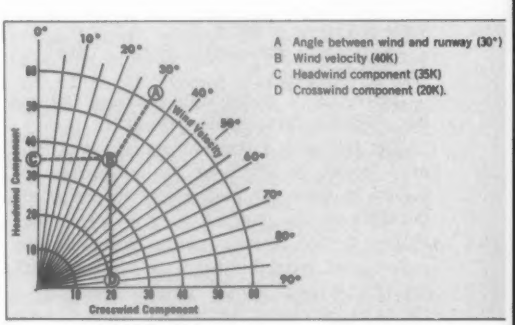
Not everyone who flies is aware that there is a limit to the headwind an airplane can handle (to say nothing of the taxiing problems that follow). As a rule of thumb the headwind limit may be estimated at 60 percent of the stall speed. The same rough rule suggests 30 percent of stall speed as a maximum for a 45° crosswind, and 20 percent of stall as maximum for a 90° crosswind.

Headwind and crosswind considerations are of equal consideration for takeoff, as well as landing, although, of course, it is usually easier to defer the former than the latter. The effect of torque on controlling an airplane during takeoff into a crosswind should not be ignored. Since torque will tend to push the airplane's nose to the left, you may anticipate that you will have less difficulty in handling a strong crosswind from the right than a blow from the left. (The latter circumstance would require left aileron and reinforce the left-turning tendency of the airplane's nose.) You could run out of right rudder before you got very far off the ground. If the crosswind component is near marginal, a left-hand crosswind calls for "no go," unless you have counter-rotating propellers.

In a stiff crosswind with full upwind aileron held, it is not unusual to find yourself making the final segment of your takeoff run on the upwind wheel only. This makes it more difficult to control the airplane on the ground, but it is nothing like the pandemonium you could find yourself in if you yank the airplane off the ground prematurely. In fact, you should plan to break ground at a slightly higher than normal speed, even if you have to force the plane to remain on the runway. When gusty crosswinds are waiting to buffet your airplane the moment it is airborne, you want to have the positive control responses that come with good flying speed.

On the other hand, there is a tendency among some pilots to carry too much airspeed when landing into a crosswind, presumably to avoid soft controls near the ground. It must be borne in mind that the greater the angle of the crosswind, the lower the headwind component: at 90°, of course, the headwind component is zero, no matter what kind of gale is blowing. If you carry excess landing speed into a zero or low speed headwind, you may have all kinds of problems getting rid of it before you lose the pavement. If the crosswind is extremely gusty, you may wish to come in a little faster than normal, but avoid releasing the throttle to fight the wind with both hands on the wheel—one good hand is all you need.

Crosswind landing accidents are usually more harmful to the airplane than to its occupants, but no one likes starting out the flying season with a bent prop. Make March a Be-Kind-to-Your-Airplane Month. ■



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Getting The Lead Out

What happens to an airplane engine run on fuel of an other-than-specified octane?

A dentist I know bought an airplane about a year ago, and it was obviously his pride and joy. He would never fly it anywhere unless he was sure the plane could be hangared overnight. He washed it down at least once a week, flew it strictly by the book, stayed away from unpaved landing strips and generally exercised the kind of loving care associated with a fond parent: he just doted on that bird.

Yet I learned, as time went by and I needed an occasional filling, that despite all of his protective measures his airplane seemed to require more than usual maintenance. Nothing serious, but plugs seemed to foul up sooner than expected, valves needed attention, compression sometimes fell off noticeably although not dangerously. No one (and he, of course, consulted the best mechanics in the county) seemed able to explain why all the little problems until one day when he persuaded me to go up with him to listen to the "funny noise in the engine" at cruise. I saw him filling his tanks with 100/130 avgas.

"Doc—you know this plane is designed for 80/87 octane?"

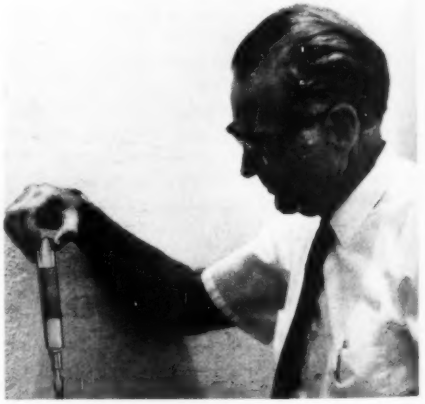
"Sure, but I never use anything but the best. What's a few cents a gallon?"

The best gas, I tried to explain as kindly as I could, is whatever the engine is designed to use—not necessarily the most expensive or the highest octane rated fuel. Higher octane usually means more lead per gallon, and what his precious bird was suffering from was a case of lead poisoning—or more precisely, fouling of engine parts due to excessive lead in the fuel.

This practice rarely leads to engine failure, but it will soon be reflected in reduced performance and higher maintenance bills. In an emergency, when the fuel for which the engine was designed is not available, no harm will come from using the next higher grade, but it is not a good practice to continue, unless you have checked with the engine manufacturer's recommendations. *But never use a lower than recommended octane—this could result in an in-flight engine failure.*

Apparently many persons believe that a higher octane rating necessarily means a more powerful fuel, which is not true. The gasoline combustion engine is designed so that energy is derived in each cylinder from an even "slow burn" (the flame travels about 250 feet per second). If the mixture of hydrocarbons which make up the fuel is not appropriate for the engine, a higher than normal pressure type of explosive combustion may take place, producing the familiar "knock" or detonation. Knocking exerts a destructive force in the engine and may damage or weaken pistons, rings, valves and other working parts. Such combustion is usually incomplete, leaving harmful deposits on rings, spark plugs or valves.

The octane rating is the percentage (or equivalent) of iso-octane hydrocarbons present in the gasoline. In general, the higher the engine compression, the higher the percentage of iso-octane required to prevent knocking. An octane rating higher than 100



Most pilots know that 80-octane gas is red and 100-octane green, but may be shocked to discover that mixing the two in certain proportions (15-20% red) can result in an almost colorless liquid resembling jet fuel.

means that the fuel has been given an anti-knock quality in excess of that provided by 100 percent iso-octanes—either by means of such additives as TEL (tetraethyl lead) or by using aromatic hydrocarbons such as benzene.

An engine that will fire smoothly with 80 octane avgas is delivering its maximum power and will not develop any more power by using 100 or 145 octane. Conversely, the engine may be weakened by the higher octanes because such fuel contains more lead, or TEL, than it was designed to accommodate.

Although quantities vary with fuel suppliers, 80/87 avgas contains about one-half of a cubic centimeter (0.5 cc) of TEL per gallon. By way of comparison, conventional 100/130 avgas will contain about 4 cc, or eight times as much lead. Avgas with a 115/145 rating will be proportionally higher in TEL. Each engine model is designed to function best not only within a specified octane rating range, but also with a predictable quantity of lead present (the precipitated lead functions as a lubricant for the valve face and seat.) Continued use of fuel with an *excess* of lead may contribute to: *valve sticking, erosion*
ring sticking
pre-ignition
plug fouling, erosion
detonation
leaded oil

FUEL CHART FOR AVCO LYCOMING ENGINES

SERIES	SPECIFIED FUEL*	ALTERNATE FUELS CONTINUOUS USE	EXCEPTIONS
235-C, -E, O-290-D	80	**80/87	
235-F	100/130	115/145	
290-D2	80/87	**80/87	
320-A, -C, -E	80/87	***91/96 thru 115/145	
320-B, -D	91/96	100/130 or 115/145	
O-320-A, -E	80/87	91/96 thru 115/145	
O-320-B, -D	91/96	100/130 or 115/145	
O-320-C	100/130	115/145	
IO-320	91/96	100/130 or 115/145	
IO-320-B	91/96	100/130 or 115/145	
IO-320-C	100/130	115/145	
340-A	91/96	100/130 or 115/145	LOW LEAD GRADE 100/130 AVGAS (w/2 c. c. TEL. MAX.) Aviation grade 100/130 fuels in which the lead content is limited to 2 c. c. per gallon are approved for continuous use in all Avco Lycoming engines listed herein.
340-B	80/87	91/96 thru 115/145	
360-A, -C	91/96	100/130 or 115/145	
360-B, -D	80/87	91/96 thru 115/145	
IO-360	91/96	100/130 or 115/145	
O-360-A, -C, -D, -F	100/130	115/145	
O-360-B, -E	91/96	100/130 or 115/145	
HO-360	100/130	115/145	
HO-360-A, -C, -D	100/130	115/145	
HO-360-B	91/96	100/130 or 115/145	
HO-360	100/130	115/145	
O-360	91/96	100/130 or 115/145	
VO-360	91/96	100/130 or 115/145	
435-A	80/87	80/87	
435-K1 (O-435-4), -A2	91/96	**100/130 or 115/145	
O-435	80/87	***91/96 thru 115/145	GRADE 115/145 AVGAS (w/4.6 c. c. TEL MAX.) Aviation grade 115/145 fuels may be used only for emergency operation in VO-435; TVO-435; VO-435-B, -C; TIVO-540; IVO-540-A, and IGSO-540 Series engines because of valve corrosion pitting that will occur with prolonged operation at maximum cylinder head temperature of 500° F. However, all other engines listed for continuous operation on grade 115/145 fuel may be continuously operated on this fuel because the valve damage hazards generally associated with high cylinder temperatures are minimized by the lower cylinder pressures in these engines.
VO-435-A	80/87	***91/96 thru 115/145	
VO-435-B	100/130	115/145	
TVO-435	100/130	115/145	
GO-480-B, -D, -F	80/87	***91/96 thru 115/145	
GO-480-C, -G and IGO-480	100/130	115/145	
GSO-480	100/130	115/145	
IGSO-480	100/130	115/145	
O-540-A, -D, -E, -F, -G, -H	91/96	100/130 or 115/145	
O-540-B	80/87	91/96 thru 115/145	
O-540-A, -B, -E, -G, -J, -K, -L, -M, -P, -R	100/130	115/145	
O-540-C, -D, -N	91/96	100/130 or 115/145	
IO-540	100/130	115/145	
IO-540-A, -B	80/87	91/96 thru 115/145	
IO-540-C and IVO-540-A	100/130	115/145	
TVO-540	100/130	115/145	
IGO-540-A, -B	100/130	115/145	
IGSO-540-A, -B	100/130	115/145	
TIVO-540	100/130	115/145	
TIO-541	100/130	115/145	
TIGO-541	100/130	115/145	
IO-720	100/130	115/145	

* - Engines specified for use with 91/96 grade fuel may also be considered to be specified for 100/130 grade. See Service Letter No. L169 for explanation.

** - O-235-C, O-290-D, -D2 and O-435-A2, -K1 (O-435-4) engines are built with solid stem exhaust valves. The use of higher leaded fuel such as 91/96 thru 115/145 must be limited to 25% of the operating time. If used for longer periods of time the same 150 hour inspection requirement, described in the following note is applicable. O-235-C and O-290-D models can be converted to use sodium cooled exhaust valves. See Service Instruction No. 1246 for procedure.

*** - Early production O-320-A, -C, -E; GO 435; VO-435-A; and GO-480-B, -D, -F were built with solid stem exhaust valves and their use with higher leaded fuels is limited to 25% of operating time. If specified fuel is not available and usage with high leaded fuel exceeds 25% the valve stems should be inspected at 150 hour intervals for erosion, or "necking". This inspection is accomplished by removing the exhaust manifold and visually inspecting the valves through the exhaust ports. To determine if an engine has solid stem exhaust valves, remove the rocker cover and look for valve rotor caps which are used with sodium cooled valves but not with solid stem valves.

Incidentally, any engine may develop a knock while using the appropriate octane if combustion is hampered by spent plugs, cylinder deposits, too lean mixture, or if the carburetor or timing gear is in need of adjustment.

The past decade has seen efforts by aviation fuel suppliers to reduce the number of octane categories of avgas. Two of the five grades once in use, 91/96 and 108/135, have virtually disappeared from the market. Suppliers believe that the great majority of light piston engines being built today can be operated satisfactorily on a 100/130 grade avgas with reduced lead content. The new low lead 100/130 now generally available from major fuel suppliers contains only about half (2 cc) of the TEL previously found in this octane rating. Low lead grade 115/145 is also being produced with a maximum of 4.6 cc of TEL.

Getting some of the lead out is clearly in the interests of a cleaner environment, as well as a means of broadening the useful range of the most popular grade. Reducing the octane categories to three (identifiable by their red, green, and purple color), obviously has the safety advantage of lessening the opportunities for mistaking the desired grade.

Nevertheless, low lead 100/130 still contains four times as much TEL as conventional 80/87 and engine manufacturers have indicated that certain engines may not be able to tolerate this amount of extra lead without some harmful effects.

Lycoming's latest service bulletin (1070D, November 1971) contains a fuel chart with complete fuel listings for all their engines. Lycoming's bulletin indicates that *most* of its engines may be run continuously on low leaded avgas of a higher than specified grade. Certain engines (notably those with solid stem exhaust valves) should not be run more than 25 percent of the time on fuel with a higher-than-specified octane rating, because of the likelihood of (lead induced) valve stem erosion during prolonged operation at maximum cylinder head temperatures. Some of these models can be converted to hollow stem, sodium-cooled valves.

The concluding half of this article, to be published in April, will include the latest Continental service bulletin on fuels, and will summarize this important subject.

The ENDLESS SIGNAL

U.S. Navy's Omega navigation system, based on very low frequency radio signals with unlimited range, holds promise for general aviation.

Loss of radio navigation signal when flying through mountain valleys may become a thing of the past, if the new very low frequency navigation system known as *Omega* lives up to present expectations. Developed largely by the United States Navy as an improvement over existing overwater navigation systems, Omega is now being investigated by FAA as a possible complementary system to the VOR.

From the point of view of general aviation, Omega has several attractions: a signal that is not obstructed by terrain, does not vary in accuracy according to distance from the station, does not require frequency changing, and is received on the ground as well as in the air.

From the viewpoint of cost of installation and maintenance, the advantages of Omega are even more attractive. *Four* stations will be adequate to cover the entire United States (aided by a number of monitoring stations). Indeed, eight stations will serve the entire world. Considering estimates that as many as 1,158 domestic VOR stations may be needed before the end of this decade to serve our growing needs (each requiring continual flight checking and ground monitoring for accuracy), the economic appeal of Omega is tremendous.

Long range radio navigation based upon the timing of radio transmissions was pioneered in the decade prior to World War II. This early work enabled scientists to develop "hyperbolic navigation," based on the difference in propagation times of time-synchronized signals from widely separated stations. Since the signals are synchronized, a positive fix may be obtained where the curved lines cross.

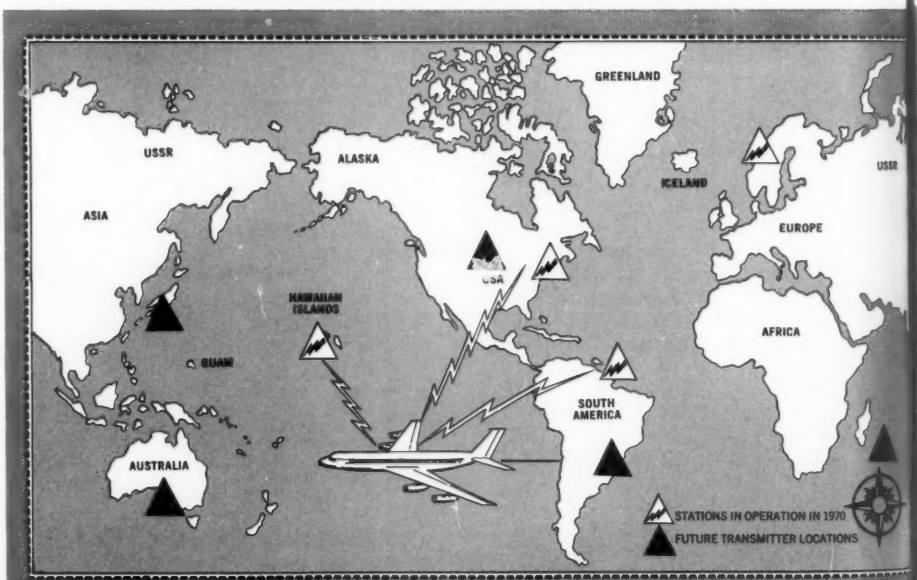
The concept was used as early as 1937 and later the British "Gee" system made possible night bombing missions in IFR weather over Germany for distances up to 400 miles. Subsequent studies at the Massachusetts Institute of Technology produced the LORAN (long range navigation) system, operable up to about 1,000 miles. LORAN became the basic navigation system for the United States Navy, as well as for commercial shipping and for transoceanic air travel. LORAN requires numerous shore stations throughout the world: position is determined by calculating the time difference between several stations.

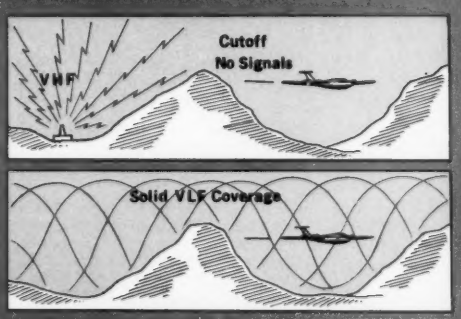
Recent discoveries about the behavior of VLF (very low frequency) radio signals have produced *Omega*, a world-wide navigation system capable of covering the entire globe with only a few transmitting stations. The Navy has established four Omega stations to date, covering most of the western hemisphere (overland as well as overwater), at New York, Hawaii, Trinidad and Norway. Later this year the New York station will be re-located in North Dakota, and by 1974 four more stations will be located in Japan, Argentina, Australia and southeast Africa.

In seeking an improvement over LORAN, Navy researchers learned that very low frequency signals in the range of 10 to 14 kHz (cycles per second) travel for exceptionally long distances—in part because the nature of the signal does not permit it to penetrate the ionosphere and thus become dissipated in space. Because the wave length of the Omega signal is very long (from 12 to 16 miles), compared with the VHF (very high frequency) wave length, (which is several feet) it is able to move over and around the highest mountains without loss of continuous signal.

Eventually all eight stations will use three basic frequencies: 10.2 kHz, 11.33 kHz, and 13.6 kHz. Each station will transmit in sequence for a second, more or less, with a 0.2 second interval between signals. Each sequence (which is continuously repeated) will last 10 seconds. Stations are synchronized in time and recognizable by the discrete length of time they transmit within the ten second format.

With Omega, the relative radio frequency phase of a suitably chosen pair of stations is measured by the receiver to determine a *line of position*. The crossover point of the two signals represents the zero phase contour of the pair, and defines a *lane* for a given frequency. For example (see Figure 2), a lane at 10.2 kHz is approximately eight miles wide (regardless of distance from the station)—the length of one-half wave-length of the transmitting frequency. The line of position so distinguished is





Two distinct advantages of the Omega VLF navigation system are the great distance over which their signals can be received and their long wave length (12 to 16 miles as compared to a few feet for VOR signals), which does not restrict the operation to line-of-sight. Omega is particularly useful over the ocean, close to the ground, in valleys, behind mountains, and over remote areas where other NAVAID reception is weak.

relative to the nearest crossover point, and will be identical in any lane; therefore, it is necessary for the navigator to identify the particular lane being used. This is one of the present disadvantages of Omega, since an aircraft (or other craft) could not enter the system without knowing its position relative to a lane. Normally, one would enter the system at a known departure point, but if there were an en route interruption of signal, it would be necessary to re-establish position by such other means as were available—dead reckoning, VOR, visual reference, etc. Methods are being devised to increase lane width up to 72 miles, so that lane identification becomes less of a problem. However, for the present it would appear that for general aviation, at least, Omega would be most helpful in VFR conditions, where visual reference will serve as a backup.

Other problems which limit the usefulness of Omega include *diurnal effect*—the lowering of the ionosphere during the day, which increases the velocity of VLF signals—and *noise*, or static. Precipitation static has always been an irritating feature of low frequency radio. Progress has been made in damping out static, and in correcting for day/night wave propagation.

On the plus side, Omega has been shown to reach all altitudes, including land or sea surface (it may also be used by submarines up to a depth of about 50 feet); it is accurate to about one mile, and does not vary with distance from the station (as the VOR signal does); it requires little or no change of frequency for hundreds of miles; and it offers the possibility of area navigation with far greater flexibility than RNAV which is dependent on VOR stations.

The actual position of an Omega receiver is established as an intersection of two or more lines of position. The computation is accomplished by the receiver and not by the pilot. Aircraft guidance information is presented on a type of course deviation indicator, such as a needle pointer, the needle showing continuous indication of error and direction to steer. Omega users will not require separate distance measuring equipment, as this information is available from the system.

Airborne hardware for Omega is relatively compact, consisting of an antenna with preamplifier, a small receiver/computer, and some form of control indicator. On takeoff the pilot or navigator inserts the coordinates of his present position and destination. The instrument will read out his course and, in flight, distance remaining.

More sophisticated Omega receivers designed for air carriers will furnish a whole array of inflight data, such as longitude and latitude, ground speed, wind direction and speed, Greenwich time, etc. Cost of the airborne equipment will range from about $2,000 for the simplest set to $30,000 or more for the most elaborate hardware.

Up to the present time Omega has been used primarily by military aircraft (and vessels), but tests are being conducted with civilian aircraft, including single engine planes. Receivers are being manufactured by Dynell Electronics, Global Navigation, Northrop, and Canadian Marconi. FAA is investigating several phases of the system in both the upper and lower price brackets, and will shortly be testing the equipment in one of its own general aviation aircraft.

Whether Omega ever replaces the VOR, or merely complements it, general aviation is bound to benefit from a navigation system that could guide a pilot safely through an Amazon valley with the same equipment he uses to navigate between Tallahassee and Terre Haute. ■

mega Transmission. Stations can be identified om the format of the transmissions. During each ansmission segment, each station transmits for distinct length of time on three different frequencies. The receiver tunes in on appropriate airs of stations located in opposite directions.

ar right—**lanes of position** are imagined as rmed by the zero phase, or crossover point of posing signals (T_1 and T_2). The **line of position** OP) is established by the receiver as a pertion of the signal wave.

Fig. 1

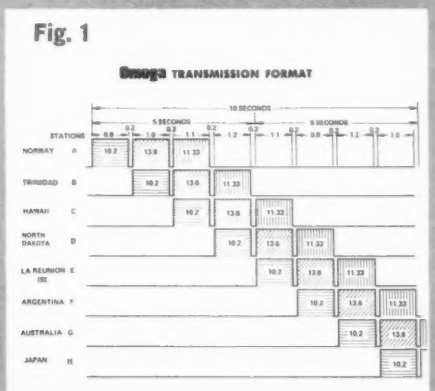


Fig. 2

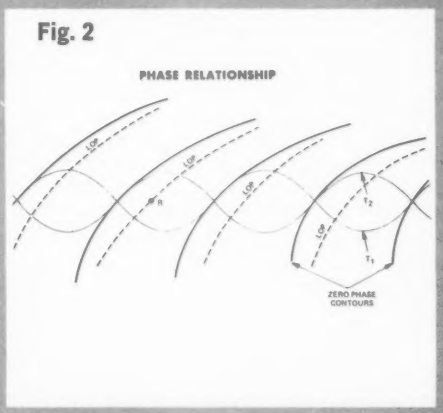


Fig. 3

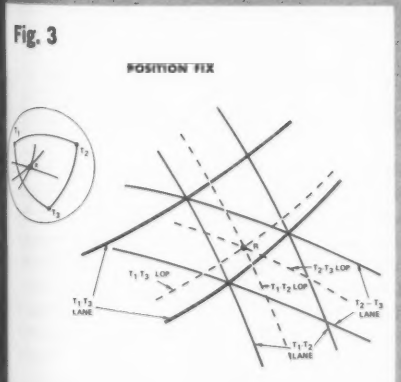
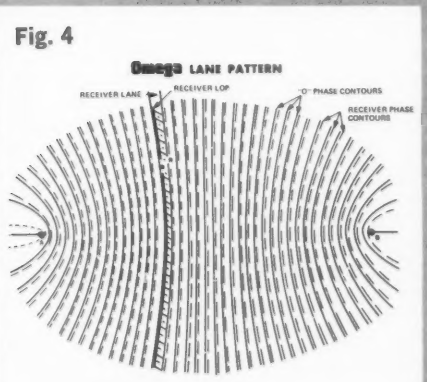


Fig. 4



Left—graphic overview of Omega VLF transmissions between two stations, A and B. This is a field portrayal of the isolated situation shown at far left. At least two pairs of transmitting stations are needed to define the position of a receiver (R).

At far left, three transmitting stations are shown providing three lines of position, intersecting at point R. Circled diagram depicts the location of three stations relative to an aircraft.

Richard B. Cox, Parkersburg, W. Va. FSS

Editor's Note: six FAA air traffic specialists from three locations have been honored with citations and cash awards for aiding and, in some cases, saving the lives of pilots in trouble. Selections were made from many dramatic "saves" involving personnel in FAA centers, towers and flight service stations, who last year helped more than 3,300 aircraft in distress to safe landings. A detailed account of the three outstanding flight assists is presented below.

Parkersburg, West Va. On the evening of April 9, 1971, a small but violent squall line hit the area without any previous warning, lashing it with lightning and rain and turbulent winds. A number of small planes soon found themselves in difficulty.

Richard Cox was alone on duty in the Parkersburg FSS when the first call for help came at 7:04 p.m. from a Cessna 172. The pilot could see a river below, but he did not know where he was and he wanted assistance to the Parkersburg airport. His altitude, he reported, was 3,000 feet, heading 350°, with one-half tank of fuel.

Cox determined that his DF bearing was 230° from the station, and he told him to turn right to a 050° heading. The flight specialist also gave him the weather at Parkersburg; 5,000 feet overcast, visibility 7 miles, with cloud-to-ground lightning west to northwest. He instructed the pilot to watch for lightning off to his left, to remain VFR at all times, and to inform him if he was unable to do so. The pilot followed directions exactly, and during the course of the assist Cox was only obliged to correct the Cessna's heading twice.

However, two minutes later, Cox received a call from another Cessna 172. This plane was enroute to Akron, Ohio, from an original departure point in eastern North Carolina, but the pilot had diverted south because of the rain and lightning and turbulence. Cox gave him the weather conditions throughout the entire area. The pilot decided he had better put down at Parkersburg, and he requested help in finding the airport. In spite of considerable radio static Cox was able to give him a 270° heading and he kept the plane under observation as it maintained that course perfectly.

Cox now had two planes in the air, and he continued to study the incoming weather reports, and to send out special weather reports on the condition of the storm. Then suddenly at 7:12 p.m.—just 8 minutes after the first distress call—Cox heard over his radio: "MAYDAY, MAYDAY, I'm lost, help!" A PA-28 was broadcasting, but Parkersburg radio was unable to contact it due to the continuous broadcasting. Cox could hear children crying in the background as the pilot repeated his emergency call. He alerted the DF network and Charleston (W. Va.) FSS was able to give the plane headings to that city. Cox never did contact the plane directly, but he was given credit for the assist in handing it over to Charleston. And he continued to keep track of it in the sky.

He now had three distressed planes to watch.

At 7:18 a third Cessna, a 310, called for help, the pilot explaining that he was caught in the rain and turbulence and he had lost all of his radios except VOR. Cox learned that the pilot was IFR rated, and he proceeded to give him DF steers to the airport. Since this pilot was unable to contact the tower, Parkersburg FSS relayed landing and clearance information to the plane.

There were four troubled planes in the sky now, and Cox turned his attention back to the first one. After he gave it a final directional correction, the plane contacted the tower and landed safely at Parkersburg at 7:25. Fifteen minutes later the IFR pilot landed, and Cox began to breathe easier. There were only two planes still up there.

A Busy Night

Six minutes later a fourth Cessna 172 called to request the weather to Akron, Ohio. Cox gave him the current weather conditions locally and enroute. No problem there. At 8:40 the plane from North Carolina landed at Parkersburg. Only one still up there, the PA-28 heading toward Charleston.

But then ten minutes later that fourth Cessna quickly radioed again that there were sick children on board now, and the pilot requested assistance to land at Parkersburg. Cox gave him a 335° heading, and four minutes later the pilot reported that he had the airport in sight.

During all this time Cox was also contacting pilots who had volunteered to help the distressed aircraft. One of these volunteer planes, a Navajo PA-31, was vectored (by Charleston approach control) to the vicinity of the Cherokee heading for Charleston and it established visual contact with it. Finally, at 9:02 the PA-28 touched down safely in Charleston.

Trouble in the air has a habit of coming in bunches but five distressed airplanes within two hours is a high par for the course. Each of the five pilots was intelligent enough to call for immediate assistance, and because of the calm professionalism of Richard Cox each was guided to a safe landing.

Keeping Them Of

"I'm not lost. I just don't [illegible] miliar landmark is bound to [illegible] soon
"I ought to have enough fuel [illegible] here."
"I'd look pretty silly if I [illegible] help, right over the airport."

These are the kind of thoughts that get pilots into trouble. In fact, the pilot muttering these words is probably already in trouble which he refuses to recognize. The landmark he is waiting to recognize could turn out to be his own tombstone, if he just does not happen to be lucky enough to blunder onto familiar terrain. Fuel/time remaining is computable, if he has kept an accurate flight log; otherwise it is only a wild guess. If he worries about looking silly calling air traffic control prematurely, how is he apt to look after landing in a tree?

Fear of embarrassment has led untold hundreds of pilots into accidents that need never have occurred, if pride had not been placed ahead of safety. No one likes to admit publicly that he is no longer safely in control of his airplane, but if it is the actual

Cleveland, Ohio. The crisis began in the early evening of July 17, 1970, when Edgar Evans was taking over his Inflight Position at the Cleveland FSS. Another specialist who was monitoring frequencies during the transfer of positions told Evans tersely that an emergency broadcast had just been received. A weak and strained voice had said over the radio: "I've lost my equilibrium and I've vomited. I don't know where I am, I don't know what frequency I'm on—it's 121 point something. I need help. This is 28X."

...ien Of The Trees

...on't ...r sure where I am, but a fa-
...d to ... soon."
...h fuel ...ere."
...I as ...help, and they told me I was

situation, the sooner he reports it to the nearest air traffic service ground facility, the sooner he can expect to regain control. Air traffic personnel are not miracle workers, but given enough warning and information they can prevent all kinds of accidents.

Some pilots are reluctant to call for assistance because they are afraid this will eventually involve them in all kinds of paperwork, and perhaps result in a violation. This is seldom the case. In the vast majority of flight assists all that happens is that a report is filed with the local GADO, which in turn writes the pilot a letter offering help in avoiding further problems in the sky. In the three reports that follow, promptness in appealing for assistance was the key to safe solution of a variety of flight problems, any of which could have had serious consequences.

Edgar C. Evans, Cleveland FSS

Richard F. Fagan, Cleveland FSS

Keith R. Alves, Cleveland Tower

Evans went to work immediately, broadcasting on all frequencies in response to the emergency call and asking 28X to respond again. A few seconds later a slurred voice came on the radio at frequency 122.0, saying, "I'm a student pilot with approximately 20 hours flying time. I've never experienced this feeling before. I can't look out of the plane—when I do I become dizzy."

Evans began to talk soothingly to the sick and distraught pilot while a call was placed to the Cleveland Hopkins control tower for radar assistance. At the tower, controller Keith Alves was on duty and he asked Evans if he could have the pilot change his radio frequency so that he could talk directly with him. Evans relayed the message, but the pilot said he was not able to see the radio dial clearly. Evans thought for a moment, and then told him to leave the radio dial alone; he would be the coordinator, transmitting messages between pilot and tower. Speaking calmly and slowly, Evans next attempted to find out pertinent data from the pilot—fuel situation, altitude, and last known position. The confused pilot said he had a full tank of gas, but he did not know his position. He said he had departed Strongsville, Ohio, airport only a short while ago and was heading 240°.

Richard Fagan, another air traffic specialist working beside Evans in the Cleveland FSS, placed a quick call to the Strongsville Airport. The manager was able to tell him that 28X was a blue and white Cessna 150 which had taken off a few minutes earlier, piloted by a middle-aged student pilot on a solo training flight.

"I Can't Look Down"

Now they knew the magnitude of their problem. They had an inexperienced pilot somewhere up in the sky suffering from such extreme vertigo that he was unable to look out of the window. He did not know where he was, he could not make any visual sightings, and he was not even able to talk directly with the tower. Evans and Fagan in the FSS, along with Alves in the tower, were all going to have to work with enormous precision and cooperation to save this one.

The first thing to do was obtain a positive radar fix. Cleveland radar gave directions for a number of slight turns, and Evans relayed them to the pilot who was able to make the maneuvers. Fagan meanwhile was puzzling over the sudden vertigo and he thought perhaps it might be a case of carbon monoxide poisoning. He suggested it to Evans, and Evans asked the pilot if he had opened his window. The pilot answered that he had not, but he would do so immediately. As the pilot breathed in the fresh air, he said he felt slightly better but he still could not look out without becoming dizzy. *All right,* Evans told him, *just continue referring to your instruments.*

Cleveland Approach was still giving directional turns for a positive radar identification; he thought that perhaps the pilot might be able to see the city of Cleveland by this time. Evans asked the pilot, but he said he still could not look out of the window. *Well, can the pilot tell if he's over land or water?* Cleveland radar room wanted to know. But again the pilot was unable to determine even that.

However, after a few more turns positive radar identification was made; they knew now precisely where the Cessna was and they could direct him towards the Cleveland airport. The FSS had informed the Coast Guard of the situation, and the Coast Guard in turn had alerted two small boats and a helicopter to guard the shoreline of Lake Erie.

In the FSS station, Evans and Fagan shifted positions so that Fagan was sitting at the Inflight Position. Fagan was thoroughly experienced with the Cessna 150 and he was now able to talk directly with the ailing pilot about his plane. He began by telling him of his familiarity with the Cessna, and he discussed the instrument and landing procedures with him. Then he reviewed the various dials on the instrument panel and had the pilot go over them with him. The pilot seemed to gain confidence but he continued to complain of illness.

Presently the tower spotted the blue and white Cessna six miles northwest of the airport. They told him they had him in view and would have him on the ground shortly. The pilot responded weakly and said he was becoming nauseated again. Fagan attempted a few more times to have him look out the window, but the pilot said he was simply unable to do it. Any hope of a visual landing would have to be abandoned. They would have to bring this ill VFR student pilot down on his instruments.

The tower cleared the area, and the emergency ground equipment took positions. An inbound Cherokee was in the sky, and the tower requested assistance from it. The Cherokee flew alongside the Cessna, barely above stall speed, in order to remain in position with it. The pilot in the Cherokee

tried to talk on his radio with the Cessna, but the sick pilot said he was receiving only a garbled transmission.

Alves began vectoring the aircraft toward his landing approach, while Fagan interpreted the instrument (air speed, rate of descent, altimeter, etc.) readings for the sick student. Alves, in visual contact with the airplane, relayed directional instructions through Fagan. The first approach was too high, and at 1500 feet Alves told Fagan to instruct him to increase power and maintain altitude for another go-around. As the plane slowly circled the airport, Fagan went through another instrument check with the pilot. The flight specialist noticed that the speed had slowed and the rate of climb had increased, and he asked if the flaps were up. The pilot responded that he had forgotten, but he put them up immediately.

The Cherokee was still flying alongside, hoping that the pilot in the Cessna could look out and see him, but the pilot continued to fly hunched over his instrument panel. They were ready now for another approach, and Alves crisply gave instructions to Fagan who relayed them to the pilot.

Alves lined him up properly on the runway and then instructed him, via Fagan, to begin his descent. A few slight corrections had to be made to keep the plane over the runway, but it was descending well. Alves told the student to decrease power, and then finally to flare out and land. The Cessna's wheels touched and rolled down the runway and Alves told the FSS, the plane was on the ground—*instruct your pilot to apply brakes cautiously and cut the engine.*

It was 48 minutes after the first emergency call.

When the emergency crew rushed over to the Cessna they found the pilot slumped unconscious in the cockpit. The ambulance took him immediately to the hospital, and he was discovered to be suffering from an infection of the inner ear which had caused the vertigo and nausea. From his hospital bed the following day he thanked flight specialist Fagan for his expert help. "I listened to you," he said, "and I felt the plane hit the ground, and I applied the braking when you told me. And then I gave out." He added:

"I don't think I could have made it that long without that instrument training I had. Thank God my instructor insisted on it."

Anchorage Alaska. "Solid milk" was the way an inexperienced VFR rated pilot described the weather as he peered through the window of his Cessna 172 trying to find the Kenai Airport in Alaska.

The pilot had not filed a flight plan for that afternoon of March 12, 1971. When he departed Anchorage airport the weather was VFR. He checked the weather conditions before departing and once again when he was airborne, but there was no forecast of any snow in the area between Anchorage and Kenai some 60 miles south.

Walter Harris, left, and
Norris Jacobson, Anchorage Center

The novice pilot soon encountered a cloud layer, but he climbed easily above it and proceeded on his way. He had three passengers on board, a young lady and two children, and the first leg of the journey was smooth and pleasant.

He was beginning his initial descent for Kenai when he realized he was in trouble. Small flurries of snow began to swirl around the plane, and he was having difficulty seeing in front of him. He quickly called the Kenai Flight Service Station and he was told that a sudden snowstorm had hit the area. The plane bounced around erratically and soon the snow was coming fast and thick. In a few moments he had lost his forward visibility completely, and now he was totally disoriented.

He quickly called the Kenai FSS again and explained his predicament: he was at 1,500 feet, VFR rated only, and he had no training or experience for this kind of situation. There was a mounting note of panic in his voice and passengers were beginning to panic and cry.

The specialists in the Kenai FSS told him to hold his plane steady while they attempted to determine his condition. They learned that he had about three and a half hours fuel on board, enough to get him out of the storm area. They decided that because of the pilot's lack of experience and the treacherous weather conditions at Kenai, it would be too hazardous to bring him down there. It would be far safer to route him back north toward better weather in the Anchorage area.

DF plus Radar

At the Anchorage Center, controllers Walter Harris and Norris Jacobson were on duty, and they received the call for assistance from the Kenai FSS. They decided that for the moment it would be wiser to have the novice pilot talk directly with Kenai, rather than having him attempt to change the radio frequency in the turbulent weather.

Kenai was using DF, and Jacobson attempted to coordinate this with a reading from his radar. However, the Center radar was only able to observe an intermittent radar target near the Kenai VOR. They later learned that the pilot was having difficulty controlling the plane in the storm, causing erratic headings. The Center also advised that a search-and-rescue helicopter be put on stand-by alert so it could be radar vectored to a crash site if needed.

Harris told the FSS to have the plane fly on a northeasterly course. For the next ten minutes Jacobson made constant comparisons between the DF bearings and the radar scope, and he observed that the aircraft headings were varying between northeasterly and easterly. Finally, they felt they had the plane firmly in focus: a continuing radar return 6 miles northeast of Kenai.

Harris then asked the FSS to have the pilot change to Center frequency, and a few seconds later he was able to talk directly with the panicky pilot. The pilot said he was at 1,900 feet, heading 030°, but the weather conditions were still "solid milk."

Harris told him reassuringly they would get him out of it if he just followed instructions carefully. He asked the pilot to make a very shallow 30° turn to the right. The radar screen showed a sharp right turn, and Harris quickly asked the pilot what he had done and he answered that he had stopped the right turn on a heading of 120°. The controller then told him that now they had a positive radar identification at the Center, and he instructed him to make a shallow turn back to the left for heading 020°, which would bring him toward Anchorage.

DF tracking was continued from Kenai, and Jacobson said the radar at the Center showed the plane was on a good heading toward the area. Whenever the plane veered off its course, Harris brought the pilot gently back on a proper heading, encouraging him all the while. At 16 miles from Anchorage, Harris asked the pilot his flight conditions again, and he responded that he was at 2,400 feet, heading 010°, but he still could not see the ground. "You will see it soon," Harris assured him.

The plane approached the Anchorage area at 2,700 feet, and all the pilot could see beneath him was a solid undercast. The panic began to return to his voice as he reported his condition to the controller. Harris told him to remain VFR above the clouds and to look around carefully and slowly to locate a hole for descent. Two minutes passed, and then the pilot responded excitedly that he had spotted a large break in the undercast to the east. A few seconds later he said he was able to see the Anchorage airport.

"You can make a VFR landing now," Harris told him, and he instructed him to contact the tower for landing clearance. His confidence restored, the pilot went through the normal landing procedures, and ten minutes later he was safely on the ground.

The seven pilots who were assisted at Parkersburg, Anchorage, and Cleveland all made it safely back to ground because they had sense enough to use their radios promptly to ask for assistance. Help is rarely more than a "holler" away, provided that you holler in time. ■

Personal Inspections

Fifth in a series of "Sunday inspections" recommended for the small aircraft owner. These checkups are designd to bridge the gap between the preflight walkaround and the mandatory "annual"—to identify trouble spots and correct them before they grow into problems, incidents or accidents. Previous articles in the series dealt with the engine, controls, landing gear and cockpit.

Observer sights along the wing over an area that feels suspiciously slack to the touch.

The SKIN GAME

The human skin is supposed to be a great revealer of the human condition. I have often heard it said in medical circles that a good diagnostician can tell a great deal about a patient long before he sees his file or hears his complaint—just from the look of his skin, the color, the tone, texture, etc. But I was surprised to hear a GADO inspector say that a good maintenance-conscience pilot could tell more about an airplane's condition with his eyes shut, just by the feel of its skin, than many pilots could ever guess from hundreds of eyeballed examinations.

His thesis was that an airplane that has taken many a rough shock from hard landings or stressful flying, or whose maintenance has been neglectfully maintained may not exhibit any obvious battle scars, but its outer covering will convey much important information about the history of the plane and the habits of its pilots. With a little coaxing, he agreed to demonstrate the following Sunday how an intelligent pair of hands could detect such secrets from my own plane.

We began in the familiar manner at the cowling and moved out around the left wing, back to the tail, forward to the right wing, and on up to the nose again.

My mentor showed me how to apply the flat of my hand firmly to each section of the metal covering of the fuselage and wings and tail, pressing gently but firmly in what appeared to be a clinical rampside manner, and releasing pressure abruptly. He called my attention, with great satisfaction, to an area near the wing strut, where the sheet aluminum, when released from his hand pressure, sprang back with a "plunk-plunk," similar to what you hear when you press the bottom of an oil can.

This "oil canning" is often symptomatic of loosened metal skin, and sure enough, we found several loose and missing rivets nearby. The hand pressure technique is apparently much quicker and surer than attempting to make a head count on individual rivets, which number into the thousands on most planes. We encircled all weak riveted areas with colored chalk, leaving them for my mechanic to deal with.

Incidentally, the upper surface of a high wing airplane is frequently neglected in casual inspections, as is the nether side of the wing in low wing aircraft. A stepladder, in one case, or a "creeper" in the other, prevents oversights in checking on critical areas of the skin.

Deterioration of the rivets may not be the actual cause of "oil-can" skin, of course. There may be a buckling or distorting of internal structural members which is responsible for pulling out rivet heads. In such a case it may be possible to sense, with a delicate professional touch, a slight crimping or wrinkling of the aluminum skin. External damage, as from prop-blasted debris or from ramp area collisions or mishandling of the airplane, also leaves a characteristic indentation which may call for a closer inspection of the associated underlying structure. Excessive corrosion of the aluminum is readily sensed by trained hands.

Depending upon the particular model, all airplanes have a number of access panels on the wing, tail and fuselage surfaces which may be removed for looking beneath the skin wherever surface damage has been detected. A strong flashlight and various arrangements of angled mirrors may be needed to get the job done, but it is worth doing properly. Most of the time you will find nothing significant, but once in a while you might make a lifesaving discovery in the nick of time.

Strategically placed mirrors will help you sight deep into the internal structure of an airplane. Looking beneath the skin may turn up fuel leaks, broken members, rust, mildew.

I noticed that my advisor in this fascinating skin game frequently cleaned his hands on cheesecloth with what seemed to me meticulous if not surgical care. He explained eventually that his hands were more accurate than his eyes in detecting leakage in minute amounts. Ruptured fuel or hydraulic lines may lead to unseen accumulations of fluid under the aircraft's skin, with very slow seepage around rivets. Sensitive fingers can tell the difference between ordinary grime and excess fluid, unless the airplane is badly overdue for a bath.

In the case of my airplane, a suspicious slipperiness was detected on the belly of the bird, directly under the pilot's seat—an area much more easily examined by feel than visually. We rocked the tail a few times, and managed to produce a telltale reddish seepage—hydraulic fluid, subsequently traced to one of the brake lines. It was a slow leak, to be sure, but who can say when I might have needed every ounce of braking power at my command?

The plastic windows and windshield, I was reminded, are also a part of the airplane's skin, and while making this kind of inspection it is worth while to run your hands over the exterior seals. If the seals are weathering badly, or the packing is starting to come loose, you may have discovered why you sometimes get your feet wet *inside* the airplane. No sense in surviving thousands of hours in the air only to be felled by pneumonia.

Finally, I learned to use my hands to check on the solidity of the radio antenna and other external fixtures such as light enclosures, and I ran a probe carefully into the pitot tube drain and all associated vents. Never, I was warned, trust anybody (especially if they are over 30) to check with their eyes alone.

The report on the "state of health" of my airplane, following this exhausting manual inspection (which actually took less than an hour), was encouraging in a clinical way: no broken members, a few minor bumps and bruises, minor bleeding—all perfectly normal findings for the age and type of plane and pilot. Nothing like what would have turned up, I was assured, if I had been in the habit of crash-landing the airplane or manhandling it savagely in flight.

I am still not sure how much of this (accurate, naturally) conclusion was based on the feel of my airplane's skin, or how much the inspector may have learned from pilot chatter around the operations shack, but I must admit that it is an impressive sort of technique. If my own rampside manner has taken a clinical turn, well, who doesn't like to play doctor? ■

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RUTH NICHOLS

The Glory Girl

One hard smack and the big transatlantic plane was in the drink, sea water surging down the aisle as everyone made for the exits. One of these was a 48-year old American, Ruth Nichols, who had signed on the flight the day before as a backup pilot. Clinging to her bobbing life raft, she thought bitterly of her cherished file of UNICEF (United Nations International Children's Emergency Fund) papers, the fruit of a lengthy labor of love, now sinking to the bottom of the sea with the airplane. A lifelong dream to be recognized as a protector of the weak and the helpless was fading into the dark waters of the North Atlantic—all because she had been so keen on chalking up another record flight.

Ruth Nichols remembered with a sense of guilt how eagerly she had left the UNICEF group in Rome to race home to New York, for the honor of being the first woman to fly around the world. Remembering too the faces of the hungry, destitute children of all nations, whose cause she had publicly espoused on her world flying tour with UNICEF, she could not understand how their needs could have been shunted aside for such a trivial matter as an air race. Her present misfortune seemed a fitting punishment—albeit a frustrating end to a dazzling career.

She had been born in 1901 to a socially prominent family of Rye, New York. From her earliest years, her dashing sportsman father had encouraged a love of sport and adventure. "I spent most of my early years with my heart in my mouth," she confessed in later years. Her early rise to prominence in the headlines as "Society's Flying Beauty," or "Debutante Glory Girl," revealed nothing of her inner fears, or the heritage of love, duty and obligation to one's fellowman that Ruth had inherited from her Quaker mother.

Ruth's first flight, in 1919, was a high school graduation gift from her father. She was so impressed by the exhilaration and freedom she experienced in the air that she determined on the spot that she would learn to fly. The slender, blue-eyed girl managed to amass enough hours in the sky (squeezed in between classes at Wellesley College) to qualify her in 1924 for the first seaplane license ever granted a woman. Before the end of her career, she was to solo in almost every type of licensed aircraft and to hold an A&E mechanics certificate.

Grounded temporarily in 1927 because of her family's financial setbacks, Ruth found office employment dull and unrewarding. Offered a chance to co-pilot a seaplane to Miami with her flying instructor, Harry Rogers, she was soon back in the air. The flight set a new nonstop record from New York to Miami, making Ruth a valuable publicity asset for the young aviation industry, and she was given a job in sales promotion for Fairchild Aviation.

In 1928 Ruth became involved in organizing and promoting aviation country clubs among wealthy sportsmen. The aim was to foster interest on a national basis by setting up exclusive flying clubs with regular competitions. Ruth's organizational fervor took her to 90 cities in all 48 states before the 1929 economic crash dashed hopes for the success of the venture.

Competing in 1929 in the first Women's Air Derby, Ruth met many other women pilots, notably Amelia Earhart. The two discussed forming a woman's flying association and when the "Ninety Nines" (named for the number of charter members) was born, Ruth was chairman of the first constitution committee.

Three World Records

In the next two years, Ruth's flying activity was intense. She set three world records for women: speed, altitude and cross country flying time. In December 1930, Ruth spanned the nation from Los Angeles to New York in 13 hours and 21 minutes (less than an hour longer than the men's record set by Frank Hawkes.) In April 1931, Ruth shattered Amelia Earhart's speed record by over 25 mph, traveling at 201.685 mph. Both these feats required tremendous skill and flying talent, but setting the altitude record in March 1931 perhaps afforded the most challenge.

With outside temperatures of −60°F oxygen was supplied by an unheated steel tank. At 28,743 feet Ruth set a new altitude record—while her tongue froze into what felt like a solid chunk. "Well," she thought, "it's a good thing I don't have to make a speech just now."

Glamorous socialite pilot Ruth Nichols, swaddled in protective clothing as she prepared for successful assault on women's altitude record in 1931. She reached 28,743 feet.

These records, in Ruth's mind, were serving as trial runs for what she considered *the* flight—the first transatlantic flight by a woman. On June 21, 1931, she lifted off from Floyd Bennett Field en route to Newfoundland, her intended departure point. Ruth's heart sang with confidence as the heavy tail wind pushed her faithful *Vega* on her way. But as she prepared to land in Newfoundland, she found herself facing into bright sunlight that distorted visibility, and too late she realized she would overshoot the field, which was bordered by a sheer cliff. She pulled up but was unable to avoid crashing near the top, wrecking her plane and breaking five vertebrae.

The most crushing disappointment was yet to come: before she could undertake another flight, Amelia Earhart was to succeed—where Ruth Nichols had failed—in making the historic first aerial crossing of the Atlantic by a woman.

Although a bitter disappointment, the Newfoundland crash served as a sort of turning point in Ruth's career. During the painful trip home to Rye in a transport plane, the seeds were sown in Ruth's mind for the need for a "flying ambulance" service. This idea was to mature and take form a few years later. Although still extremely interested in flying (she was soon out chasing records again with a brace holding her spine in place), Ruth's attention shifted more and more to humanitarian causes in which aviation could play a role.

Over the next few years Ruth flew some 3,000 miles as "Air Ambassadress" of the 30th Women's International Congress; she gave lectures promoting aviation on college and university campuses; and in 1939 she was instrumental in founding *Relief Wings*, a volunteer flying organization set up to aid victims in times of emergency or disaster. Months of fund raising, promotion activity and hard work on Ruth's part assured its success. With the outbreak of World War II, Ruth decided that *Relief Wings* could best function with government support and the organization was incorporated into the already existing Civil Air Patrol.

During the war years of change and ad-

justment, Ruth conceived the idea of a round-the-world flight for a humanitarian cause, as well as for the record of being the first woman to fly around the globe. The long awaited chance came in 1948. Appointed a Special Volunteer Correspondent for UNICEF, Ruth was authorized to co-pilot the chartered aircraft on a world tour of ten countries and to report on conditions and needs of the world's underprivileged children. Her flight proceeded to Asia, the Middle East, and Europe.

In Rome, the last stop of the tour, Ruth was enjoying a leisurely breakfast in bed when her newspaper shocked her with the tidings that a rival aviatrix was in Alaska poised for the last lap of an East-West world flight. Her competitive spirit aroused, she leaped to the phone and soon had arranged to fly as a backup pilot on the next available flight to the United States. As the UNICEF work was nearly completed, Ruth felt it would do no harm to leave the tour and strike out on her own.

The decision had a Jonah-like consequence. The aircraft overflew Shannon, the intended refueling stop, in bad weather, and eventually ran out of gas over the North Atlantic. All on board clung to life rafts during a bitterly cold, fog-shrouded night. The penitent Ruth scarcely dared pray for rescue.

With morning, search plane after plane passed over without sighting the life rafts. Finally one swooped low and dipped its wings in recognition. A trawler soon appeared and the sailors' strong arms pulled the water-logged and tired survivors aboard.

Back in Ireland, the irrepressible Ruth signed on as backup pilot with another flight and was soon on her way to the United States. Despite the crash in the Atlantic, she became the first woman to circle the globe, beating her rival by a scant 24 hours. The UNICEF papers remained at the bottom of the sea, but Ruth gave an impassioned report of her findings from memory to United Nations Headquarters.

In the sixth decade of her life Ruth continued to fly and set records. At age 57, when the most strenuous activity for many women is gardening, she piloted an Air Force plane at supersonic speeds at an altitude of 51,000 feet, higher and faster than any woman had ever traveled. This record, like many other she had set, brought her no substance and little glory, but the inner satisfaction was undeniable.

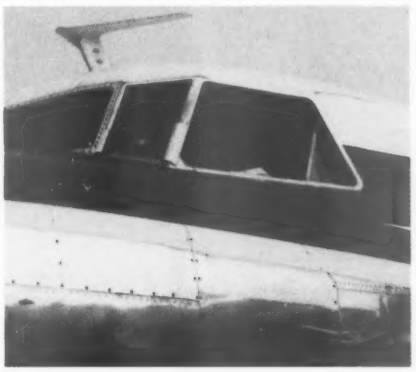
A few years before her death, in 1960, she wrote:

Flying has nearly killed me many times; it has never made me rich. Yet from the challenge of the skies, I have reaped humanity's most treasured reward—life in its fullest meaning for myself and in relation to others. *

* R. Nichols, *Wings for Life*

Pilot BRIEFS

■ ATR CANDIDATES are advised that a revised "FAA Written Test Guide for Airline Transport Pilot (Airplane)" is now available. The guide describes the type and scope of aeronautical knowledge covered by the written test, includes study material and appropriate study references, and offers sample test questions. Current FAR excerpts concerning general eligibility and experience requirements for the certificate are also included. Order AC 61-18C, stating stock number 5007-1068, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price 75 cents.



■ TAXI CHARTS for about 20 airports will be available in early spring, with a long-range plan to produce such charts for 343 controlled airports. In an evaluation of this FAA program taxi charts of 19 airports were well received. The taxi charts will be included as part of the National Ocean Survey Instrument Approach Procedures (IAP) package, and will be available to the public on a single airport basis at a minimal price. For further information consult the NOS Aeronautical Chart Catalogue, IAP revision notices or the Date of Latest Editions.

■ AREA NAVIGATION PROGRESS REPORTED. More than 1,500 persons attended an FAA-sponsored symposium on area navigation in Washington, D.C., in January. Airline and general aviation representatives reported on progress in the utilization of RNAV as a means of expanding the flexibility of the air traffic system. For availability of papers presented at the symposium, contact FAA, FS-60, 800 Independence Ave. S.W., Washington, D.C. 20591.

■ BRIGHT LIGHTS. Light measurement for aircraft position and anticollision lights is discussed in a new FAA Advisory Circular, AC 20-74. Developed as a reference for those concerned with data on measurements of aircraft lights, the circular contains material on the properties of light, types of measurements and descriptions of the equipment used to make them, precautions to be observed, and a glossary of terms and bibliography.

■ THE AIRPLANE POWERPLANT is the subject of a new handbook published by FAA as an aid to student mechanics or for review by certificated mechanics. "Airframe and Powerplant Mechanics Powerplant Handbook" (AC 65-12) contains technical information on engine construction, theory of operation, powerplant systems and maintenance of representative engine types. The book may be purchased from any Government Printing Office Bookstore, or ordered from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Send check for $3.75 each ($4.70 foreign mailing).

ACCIDENTS, FATALITIES, RATES IN U.S. GENERAL AVIATION

1961-1971

Year	Accidents Total	Accidents Fatal	Fatalities	Aircraft-Hours Flown (000)**	Aircraft-Miles Flown (000)**	Accident Rates Per 100,000 Aircraft-Hours Flown Total	Accident Rates Per 100,000 Aircraft-Hours Flown Fatal	Accident Rates Per Million Aircraft-Miles Flown Total	Accident Rates Per Million Aircraft-Miles Flown Fatal
1961	4,625	426	761	13,602	1,857,946	34.0	3.13	2.49	0.229
1962	4,840	430	857	14,500	1,964,586	33.4	2.97	2.46	0.219
1963	4,690	482	893	15,106	2,048,574	31.0	3.19	2.29	0.235
1964	5,069	526	1,083	15,738	2,180,818	32.2	3.34	2.32	0.241
1965	5,196	538	1,029	16,733	2,562,380	31.1	3.22	2.03	0.210
1966	5,712	573	1,149	21,023	3,336,138	27.2	2.73	1.71	0.172
1967	6,115	603	1,228	22,153	3,439,964	27.6	2.72	1.78	0.175
1968*	4,968†	692†	1,397	24,053	3,740,000	20.6	2.86	1.33	0.184
1969	4,767	647	1,413	25,351	3,926,461	18.8	2.55	1.21	0.164
1970	4,640	622	1,254	26,000	3,200,000	17.8	2.39	1.45	0.194
1971 P	4,686	651	1,273	26,400 (est)	3,700,000(est)	17.8	2.47	1.27	0.176

P Preliminary.

* Commencing January 1, 1968, the definition of substantial damage was changed, therefore, fewer accidents were reported. Care should be used in comparing with similar data for prior years.

† 3 suicide/sabotage accidents are included in all computations except rates.

** Source—FAA.

Note: Excludes air carrier fatalities when in collision with general aviation aircraft.

NATIONAL TRANSPORTATION SAFETY BOARD

1971 General Aviation Accident Rates Improve Slightly

A slight improvement in the rate of general aviation accidents per mile flown was recorded in 1971, according to the latest National Transportation Safety Board figures.

General aviation accidents in 1971 totaled 4,686 as compared to 4,640 in 1970, and fatalities rose from 1,254 to 1,273 during the same period. However, the rate of total accidents per 100,000 aircraft hours flown remained 17.8 for the two successive years. The rate of accidents per million aircraft miles flown dropped from 1.45 to 1.27 and for fatal accidents from .194 to .176.

Fatal accidents per 100,000 hours flown rose from 2.39 in 1970 to 2.47 in 1971.

Card-A-Clearance Program Expedites SVFR Departures

Special departure clearances via pre-planned and pre-printed cards will soon be optional at many airports. A year-long "card-a-clearance" test at three general aviation airports in the Los Angeles Basin (Long Beach, Torrance, and Fullerton) proved successful not only in expediting traffic movements during restricted visibility, but also in reducing the communications workload on pilots and controllers by more than 50 percent.

The card-a-clearance program is intended primarily for use by pilots at their home base or other airports they use frequently, and will be especially valuable where there is a large volume of general aviation traffic and a recurring fog and smog problem.

The wallet-sized cards are issued to pilots on an individual basis by FAA control towers at participating airports, and contain the card number, pilot's name, an "understanding and acceptance" agreement signed by the pilot, and the standard local procedures for three types of departures: *Special VFR; IFR to VFR conditions;* and *IFR Tower En Route Control,* (where the towers of airports located close to each other handle an IFR flight without going through the center). Pilots also are given instructions for using the procedures, including recommended phraseology.

A pilot requesting a card-a-clearance departure will give the tower his aircraft and card number, and specify a departure route from those on the card. If traffic permits the controller will issue a brief "cleared as filed," eliminating the need for a time-consuming clearance delivery and readback.

The program will go into effect at individual airports as the need is determined by the tower, and local announcements will be made to advise pilots when the new procedure is to be adopted in their area.

Private Airports to Get FAA Help

Privately-owned, public-use airports will be eligible for FAA facilities and services under a new policy which amends FAA's Airway Planning Standard No. 1, following a positive response to an FAA proposal made in July. Previously, only publicly-owned airports were eligible for FAA-provided and maintained control towers, airport surveillance radar, terminal navigation aids, etc. In order to qualify, private airports must guarantee continued public use of the airport without discrimination and without exclusive rights use, and must comply with safety and obstacle clearance criteria.

The new policy recognizes that many privately-owned public-use airports serve the same purpose and provide the same benefits as public airports. Federal grants under FAA's Airport Development Aid Program (ADAP), will still be restricted to publicly-owned airports as required by legislation.

TRANSPO Visitors Need Number

Pilots planning to fly into Dulles Airport during TRANSPO '72 (May 27-June 4) should have a TRANSPO *Control Number,* which will be requested on initial contact with Dulles tower. Write for Control Number indicating date and time of expected arrival and departure, to TRANSPO '72, Box 17204, Dulles Airport, Washington, D.C. 20041. After April 1 phone (713) 471-4830 for Control Number. A complete guide for TRANSPO will appear in April.

White Lights, New Paint Pattern In Revised Obstruction Marking

A beachball pattern of vertical orange and white stripes for marking water towers and the use of high intensity white obstruction lights are two new items in a revised booklet on obstruction marking and lighting recently published by FAA. The circular describes methods for painting obstructions and for the use of red and high intensity white obstruction lights.

Lighting standards have been altered (with the aid of pilot evalution) to allow the white lights for daytime marking in lieu of paint on smokestacks and similar obstructions, as well as for night use.

The white light standards do not presently apply to skeletal type structures such as antenna towers, but evaluation tests will soon be conducted in the field. Test locations will be listed in Airman's Information Manual (AIM) Part 3, under Special Notices—General, and pilot comments are invited.

Advisory Circular AC 70/7460-1A is available free of charge (earlier editions were sold) from DOT/FAA Distribution Unit, TAD 484.3, Washington, D.C. 20591.

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Transition Areas

I am concerned about instrument approaches at uncontrolled airports where the floor of the controlled airspace is 700 feet AGL and IFR descent minima are 600 feet and one mile. In instrument weather it is entirely legal for VFR traffic to be skimming along just below the clouds as long as they have VFR minimums which, in the uncontrolled airspace below 700 feet, would be one mile visibility and clear of clouds.

The tendency of most pilots on an instrument approach is to get to minimum descent altitude as quickly as possible (where there is no glide slope). The result is that on descending through the transition area floor one may suddenly find himself nearly on top of some VFR aircraft dodging the bases. The increasing use of IFR approaches to uncontrolled fields by both general aviation and airlines seem to make this kind of situation more common.

Ann Arbor, Mich.

There are a number of uncontrolled airports for which instrument approaches have been prescribed where the base of the associated controlled airspace is 700 feet AGL. (These transition areas *are identified on sectional charts by magenta shading.) Although they are not completely protected from VFR traffic, experience with these instrument approaches has proven them to be practical and safe.*

Control zones *(with controlled airspace from the surface upward) would be highly desirable, but the locations do not meet the necessary requirements. Before a control zone is established two prerequisites must be met:*

First, rapid communication capability between ATC and the aircraft operating within the control zone must exist down to the runway surface of the airport involved. Secondly, a weather observation and reporting service for the airport must be established. Considering the relatively few instrument approaches at these airports, the cost of the necessary communications and weather requirements cannot be justified.

In the situation you describe concerning instrument approaches below the floor of controlled airspace, reliance must be placed on the see-and-avoid responsibilities of all pilots, both VFR and IFR. To this end FAA has established "Good Operating Practices" for aircraft operating on and around noncontrol tower airports and the information can be found in the Airman's Information Manual. We specifically refer you to AIM Part 1 on "Airport advisories at nontower airports" (Pages 1-27, 1-28) and "Nontower airports" (Page 1-39).

• For Emergency Use Only

As an instrument pilot I am frankly much more worried about losing my radios while in a cloud than I am about having my wreckage located after the ensuing crash. Since I am now required to invest in an emergency locator transmitter (ELT) I should at least like to have one that will pay its own way: i.e. serve as a backup radio that could be used to make a D. F. approach. Although some of the more expensive ELT's now marketed have a voice transmission feature, I have not yet found one that allows the user to switch off the emergency "beeping" sound and merely make use of the voice transmission option. Does FAA subscribe to the "multiple use" concept enough to encourage the manufacture of such an item?

Sue N. Stidham
Amherst, Mass.

The ELT does not lend itself well to other functions (such as communications or direction finder approach). The limited life of a self-contained power supply (batteries) and access only to the two distress frequencies are restricting factors. An ELT with an on-off switch for the emergency signal would negate the automatic safety function of the item in case of emergency (which was the original intent of the law). However, the capability of some ELT's to transmit voice is not prohibited by FAA, provided the transmission of the distress signal is not thus degraded.

• Bird Watching

Do you have any information regarding the colors which are most noticeable for an aircraft in the air?

Harold L. Olsen
Madison, Wis.

Information gathered from a report "The Role of Paint in Midair Collision Prevention," prepared for FAA in 1961, was not considered conclusive enough by FAA to recommend painting aircraft specific colors or patterns. For a copy of the report send check or money order for $6.00 to National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22151. State name of report and catalog number: AD 273691.

• Flying With a Hitch

I have just recently seen a news item concerning hitchhiking by air. It seems that it is possible for one to obtain free flights out of general aviation terminals, usually on empty business jets. Taking into consideration this nation's transportation needs and the environmental effects of transportation in general, it would seem that moving more people more effiiciently with less expenditure of petroleum products is an excellent idea. I would greatly encourage the development of air hitchhiking.

Unfortunately this idea will rapidly go the way of auto hitchhiking without the assistance of the FAA. A type of moderate regulation seems in order.

Thomas P. Moore
Wellesley Hills, Mass.

We believe the suggestion to be impracticable. The private segment of the industry would likely, and understandably, consider any action in this respect an invasion of privacy by the government into their affairs and totally unwarranted from a safety standpoint.

The commercial segment of industry and the Civil Aeronautics Board, who control the economic aspects of air transportation, would also find any such attempt of Federal Aviation Administration to become involved in this matter totally unjustifiable and outside our sphere of responsibility.

SOUND OFF, AIRPLANE DRIVERS!

In order to make FAA AVIATION NEWS more useful by planning articles with readers' needs in mind, the editors ask that you fill out this simple form. It need not be signed. Mail to:

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Crop duster	____	Physician, dentist	____
Mechanic	____	Lawyer	____
Fixed base operator	____	Writer	____
Business	____	Other (specify)	____

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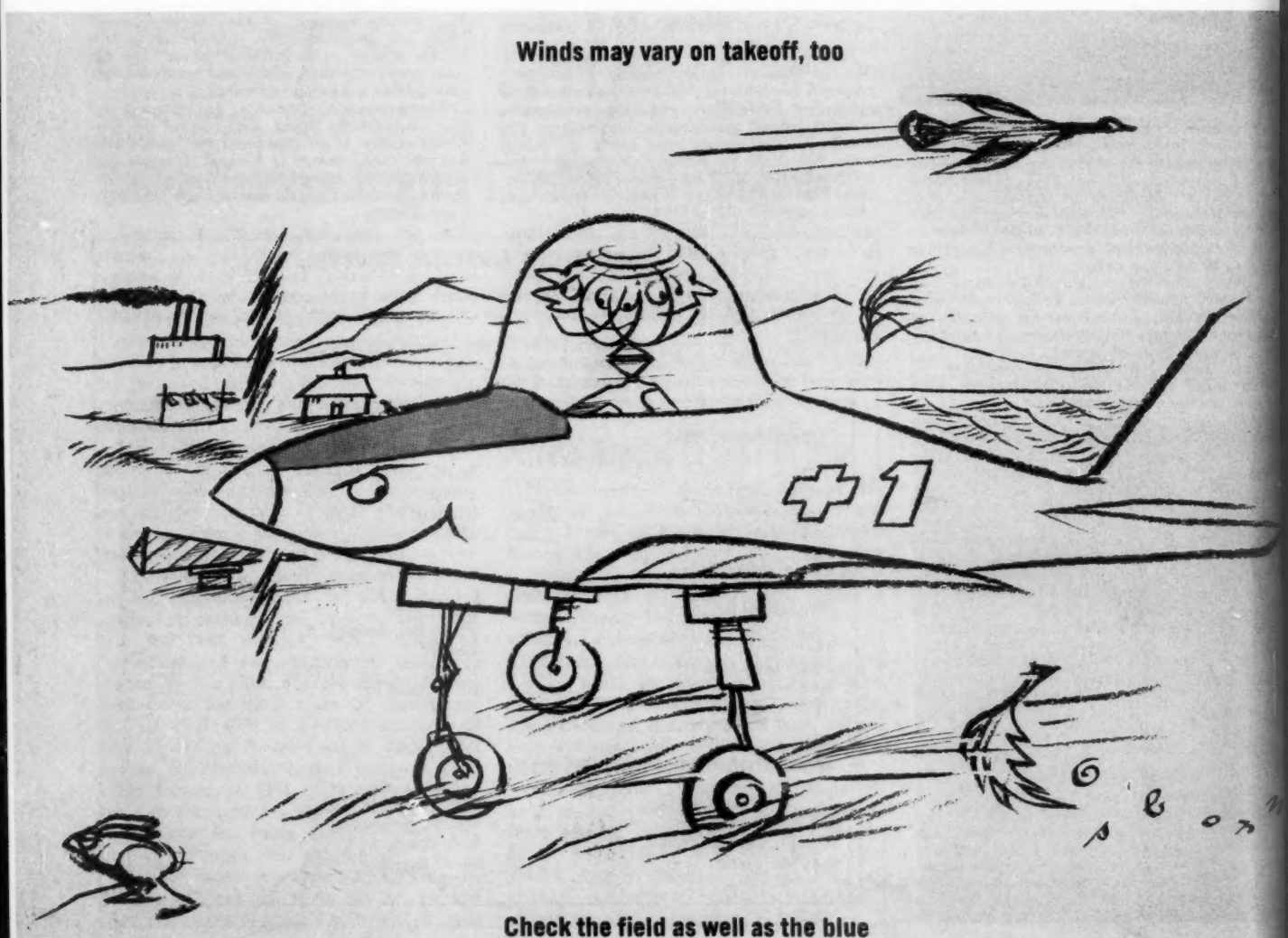
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